Towards End-to-End Optical Training of Neural Networks

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We propose a practical scheme for end-to-end optical backpropagation in neural networks. Using saturable absorption as the optical activation function, we find that the backwards propagating gradients required to train the network can be approximated in a surprisingly simple pump-probe scheme. Simulations show that, under readily obtainable experimental conditions, our approach can achieve equivalent performance to state-of-the-art computational networks on image classification benchmarks. In this talk, we will also report our latest experimental progress towards this goal based on free-space optics.